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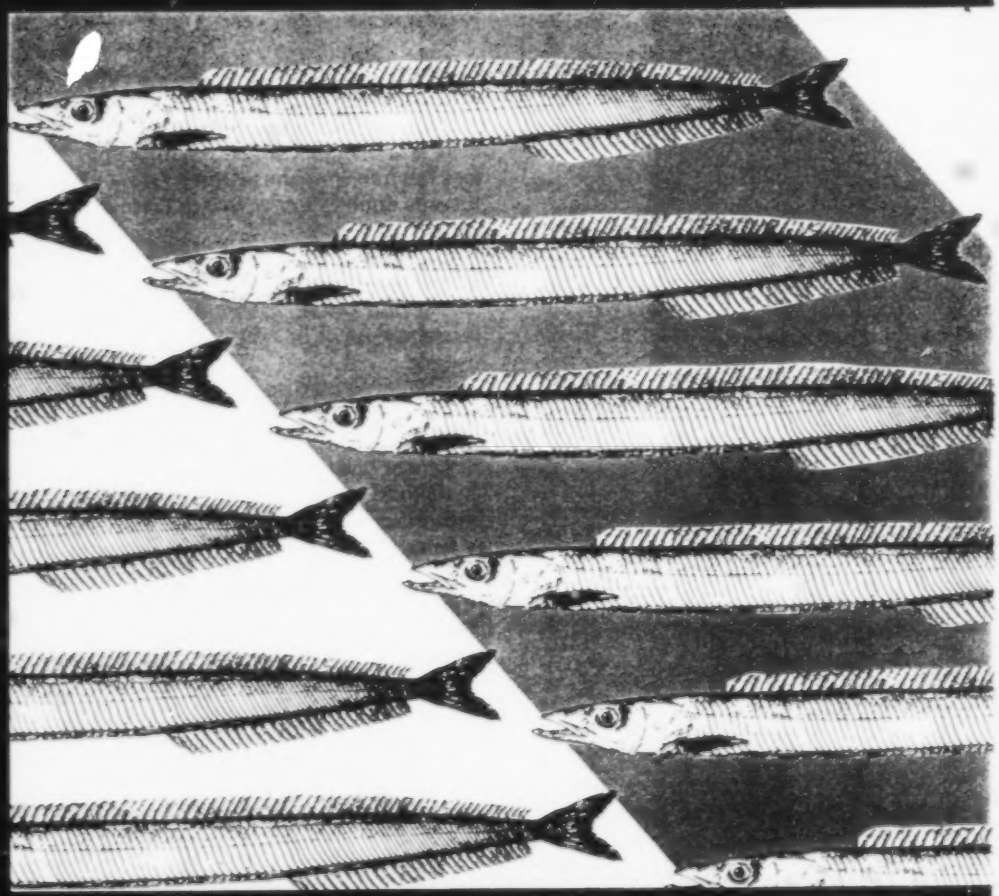
UNDERWATER WORLD



Fisheries and Oceans
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Canada

Sand Lance

Together with dogfish and skates, sand lances (sand eels) may be one of the major unexploited fish resources of the northwest Atlantic. The main evidence for this lies in the occasional large catches by fishing vessels from Georges Bank in the south to the Newfoundland Grand Banks, and even Greenland in the north. Additional evidence is provided by the fact that it is a major food item for cod, salmon and several other commercial species, and that the larvae are the most abundant and widespread fish larvae in the northwest Atlantic in the early months of the year.

The name sand lance (launce) or sand eel describes its slender body form but it is not related in any way to the common eels. The northwest Atlantic species fall into the genus *Ammodytes* but there is doubt about whether there are one or two species. It is generally accepted that the offshore, northern species is *A. dubius* and the inshore species *A. americanus (= A. hexapterus)* but the characteristics of the two species overlap.

Description

The sand lance is easily identified by its slender body, pointed snout and long dorsal and anal fins (Fig. 1). The fins and rather cylindrical body distinguish it from capelin with which it is often confused. It reaches a maximum length of about 37 cm on the southeast Scotian Shelf but size decreases to the north and south where maximum length of 20-25 cm are usual. Its colour ranges from iridescent deep blue-green to bronze on the back, with white belly when live, but the back darkens and dulls soon after death.

Fig. 1 Sand lance

Distribution and Behaviour

Sand lances of various species are found on both sides of the north Atlantic and in the north Pacific. In the northwest Atlantic (Fig. 2) they extend north from Cape Hatteras to Labrador, Hudson's Bay and West Greenland. They are restricted to shallow water, generally in less than 90 m, either along the coast or to the tops of offshore banks, and to sand or light-gravel bottom. There is no evidence of long-distance migration but they make short passages from rest areas to feeding grounds. They do not appear to seek deeper, warmer water when temperatures fall in winter as so many other fish species do.

Probably the most interesting aspect of the sand lance is its habit of burrowing into the sand or gravel of the sea bottom, from which it gets its scientific name (Greek *Ammodytes* = sand burrower). This habit is associated with rest between periods of feeding activity and may be correlated with tidal currents or time of day. There is some evidence that the fish avoids strong tidal currents and feeds mainly during the day.

The burrowing habit leads to one of the most peculiar features of the sand lance. In many coastal areas in Europe and North America, the fish buries itself in the sand between tide levels so that it remains in exposed beaches when the tide falls. Digging for sand lances is a popular pastime in such areas — they are used as bait. How the fish survives for hours in the sand, when there is little water for respiration, is an interesting problem in physiology which does not appear to have been investigated.

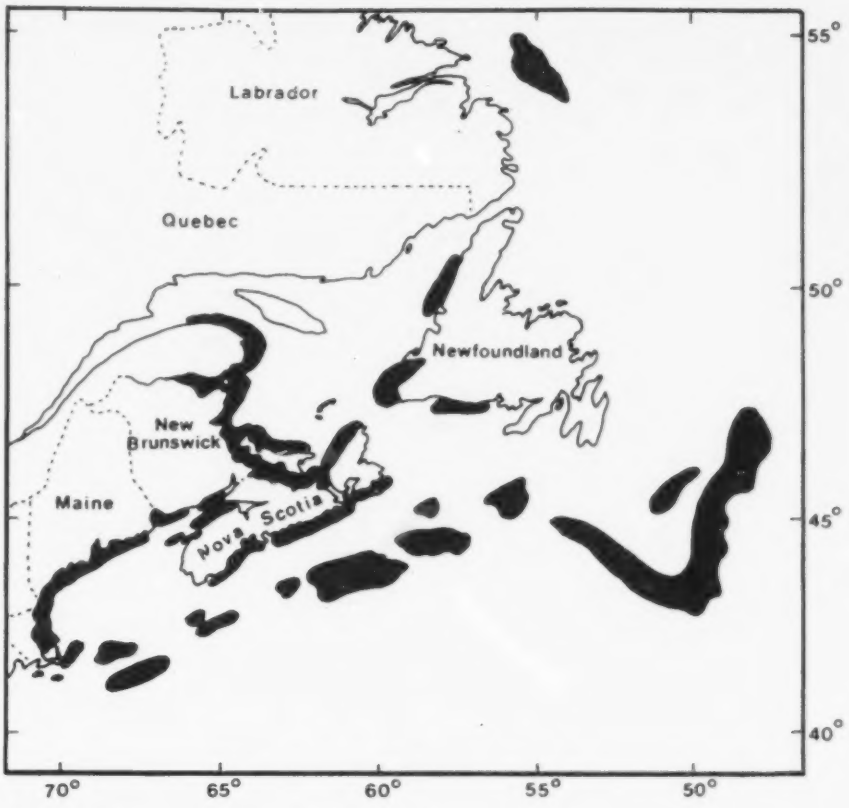

Fig. 2 Sand lance distribution in the northwest Atlantic

Reproduction

Sand lances in the northwest Atlantic mature towards the end of their second year of life. They spawn on sand in shallow water during the winter months and their eggs are laid on, or fall to the bottom where they stick to sand grains. The ovary forms a large part of the total weight of the ripe female and each fish lays many thousands of eggs.

On hatching, the larvae (Fig. 3). rise to surface waters where they remain for a few weeks, providing an important food source for predators. When they are a few centimeters long, they develop into juveniles with adult coloration and descend to the bottom where they remain for the remainder of their lives.

Feeding

Although sand eels feed on a variety of small organisms, by far the most important in their diet is copepods, particularly *Calanus finmarchicus* which, in one study, occurred in 95 per cent of fish examined and formed 65 per cent of total stomach contents. Records from coastal waters in Europe show that the fish emerge in small groups from the sand where they lie, then join other groups as they move out to deeper water to feed.

They feed by snatching at prey as it passes and are believed to follow concentrations of crustaceans as they rise through the water column as light fails in the evening, so that the fish are near bottom during the day and off bottom (or in the sand) at night. Claims that concentrations of sand lance are seen on the surface at night may result from confusion with the saury or billfish *(Scomberesox saurus)* which occurs in large schools on the Scotian Shelf in summer and is attracted to the lights of fishing vessels. The two species are easily distinguished out of the water as the saury has long needle-like jaws.

Some fishermen have claimed to have followed the rise of concentrations of sand lance at night on their echo sounders, so it may well be that under certain circumstances the fish do feed at night.

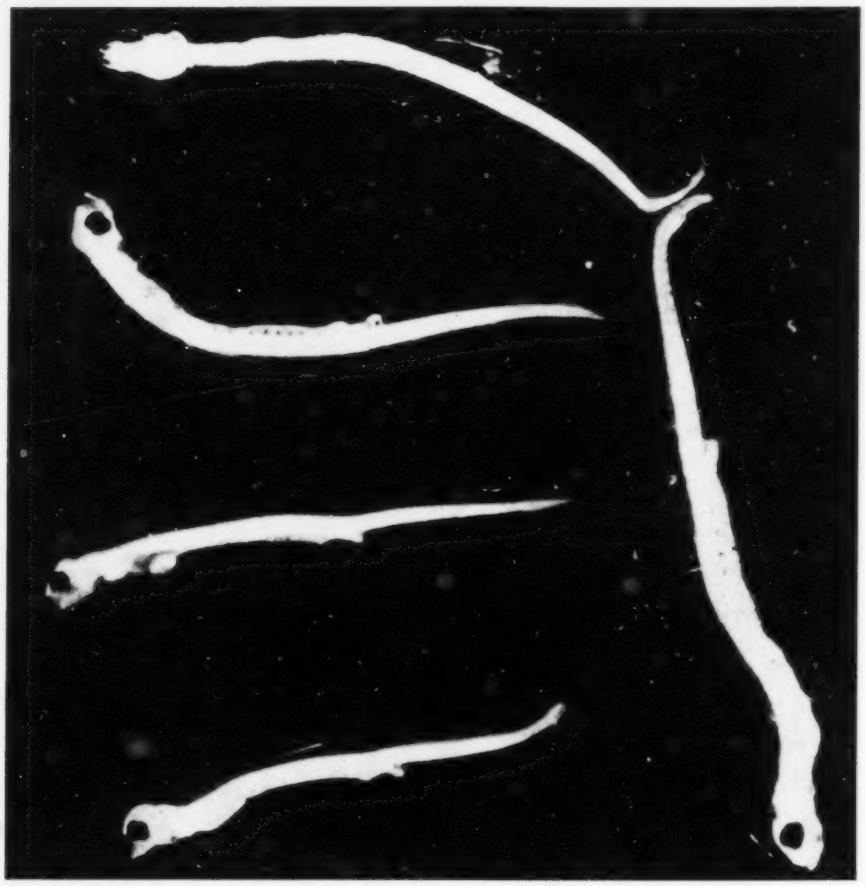

Fig. 3 Sand lance larvae

Growth and Age

Sand lance in the northwest Atlantic grow quickly for the first four to five years and slowly after that. Age is determined fairly easily from otoliths (Fig. 4). The definition of growth zones in the otolith is much clearer in fish from colder, northern waters than it is in warmer water. The maximum age so far determined for *A. dubius* from the Scotian Shelf is nine years. There does not appear to be any difference in growth rates between males and females.

The Fisheries

There is no Canadian fishery for sand lance. In New England, there is a minor bait fishery which landed 20 metric tons (t) in 1982. In conjunction with a 5 t catch by the USSR (presumably by-catch), the total catch from the northwest Atlantic was 25 t. This contrasts with the total North Sea catch, in the same year, of 660,149 t and a peak North Sea catch in 1980 of 768,760 t. The North Sea fishery is a multinational, industrial fish operation.

The lack of a fishery for sand lance on the Scotian Shelf and Newfoundland Grand Banks may not be because of lack of resource. Factors which also play a part are: distance from market, lack of market demand for sand lance and for fish meal, and no special methodology for capture. In the North Sea, the grounds are fairly near, there is an assured market and a highly developed methodology involving intimate knowledge of fishing grounds, specialized gear (light, fine-meshed trawls with weighted groundropes that sweep bottom) and refined techniques (fishing along crests of sand ridges) which make the fishing a highly-skilled operation.

The techniques to suit local circumstances could be developed in North America if an adequate market and resource existed. The latter is unproven but during experimental fishing operations in 1971 by the Nova Scotian Department of Fisheries, using a small (18 m) trawler with a Danish "Butterfly" net, catches on three consecutive tows averaged 5.4 t per hour, indicating a very considerable resource. Unfortunately, catches at other times varied so much that a commercial operation was not thought feasible. Improved knowledge of fish distribution and behaviour might well solve the problem.

Management

With no fishery, there is no management of the sand lance resource. If a fishery should develop, it might be necessary to protect sand lance stocks, not only to optimize the fishery but also to ensure that the stocks are not endangered as a forage species on which some of our major commercial species such as cod and yellowtail flounder depend.

Fig. 4 Sand lance otolith

Further Reading:

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Reay, P.J. 1970. *Synopsis of biological data on North Atlantic sand eels of the genus Ammodytes.* FAO Fisheries Synopsis 82.

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Underwater World factsheets are brief illustrated accounts of fisheries resources and marine phenomena prepared for public information and education. They describe the life history, geographic distribution, utilization and population status of fish, shellfish and other living marine resources, and/or the nature, origin and impact of marine processes and phenomena.

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